IDIOPATHIC MYOFASCIITIS IN FERRETS: HOW TO AVOID IT BEING UNNOTICED.

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INTRODUCTION

Idiopathic myofasciitis is a disease described in ferrets for the first time in 2003. It is a serious disease, with a mortality rate around 100% of the affected animals. Although its aetiology is unknown, an immune-mediated origin, causing severe inflammation of the skeletal, smooth and cardiac musculature and associated connective tissue is suspected. In recent years, the reported number of cases of myofasciitis has experienced an exponential growth. However, limited information about the disease and the non-specific clinical signs complicate the definitive diagnosis in many cases.

THE DISEASE AND ITS DIFFICULT DIAGNOSIS

The term myofasciitis (also called myositis, polymyositis or disseminated myofasciitis) refers to the major and most typical pathologic finding in affected ferrets: a severe inflammatory process that affects mainly smooth and skeletal muscle, and the surrounding tissues. Such inflammation, pyogranulomatous, affects fascias of muscle fascicles, causing pain and muscle atrophy among others.

The cause that induces the occurrence of myofasciitis in ferrets is unknown, hence the term idiopathic. No infectious agents have been identified in numerous studies or direct relationships with the use of specific drugs or vaccines. Possibly, there is a hereditary component, according to the author's experience, and an inherited predisposition for some forms of myositis both in humans and dogs. Therefore, any factor that may interfere with the immune system (vaccines, drugs, infections...) could trigger the emergence of this type of immune-mediated condition in predisposed ferrets.

The diagnosis is one of the main problems that the general practitioner can face with ferrets. First, there are few references about the condition. In most textbooks, myofasciitis is simply and briefly quoted, and many references from journals are reviews of previously published papers. For this reason, myofasciitis can be left out of our differential diagnosis, just due to the lack of awareness about its actual incidence or not knowing (or being able) to identify it.

The second factor that complicates its diagnosis is its clinical presentation. Clinical signs are usually non-specific and often go unnoticed by the clinician. Hiporexia, weakness, diarrhoea and hyperthermia are common findings in many sick ferrets, present in a large number of diseases. Even so, some aspects related to the onset, progression, and the severity of these clinical signs can aid guiding the case. The lack of specificity of its presentation increases the value of diagnostic tests, both for the detection of changes that support the presumptive diagnosis of myofasciitis and to rule out other diseases.

PRESENTATION AND CLINICAL SIGNS

The first fact that must guide us to include myofasciitis in the list of possible differentials is the age of the ferret. Myofasciitis is a disease that mainly affects young animals. Most affected ferrets are under one year of age, and animals above 2 years-old are uncommon, although there are reports of older ferrets (4 years). There are no significant differences between sexes.

As in any case, it is essential to get the maximum information from the patient and its clinical history, as well as its housing and management. Possibly, one of the most important data refers to the onset of clinical signs. The most common clinical presentation involves an acute/subacute onset of hiporexia/anorexia, weakness and lethargy, usually associated with severe hyperthermia (40-42 °C). Owners often describe a completely normal animal till some days (or even hours) prior to the appearance
of the clinical signs. Ferrets with myofasciitis often show dehydration, malaise and pain during the abdominal palpation, as well as hyperaesthesia, mainly in rear limbs. On physical exam, some other non-specific alterations such as lymphadenopathy or splenomegaly can be found. Other clinical signs include diarrhoea (mainly greenish), dyspnoea / tachypnoea, and tachycardia. Some ferrets present alterations in the skin, such as nodules or orange areas along the body and face.

If we look at most references, this picture of acute discomfort and pain in a young ferret could be perfectly attributed to other pathologies, for example a foreign body that causes intestinal obstruction; but let's not forget that there are other diseases in young ferrets beyond the foreign bodies.

**DIAGNOSTIC TESTS**

When a ferret is presented with the aforementioned clinical signs, it is essential to perform a blood analysis. The main haematologic disorder in patients with myofasciitis is the presence of a moderate to severe mature neutrophilic leukocytosis, \(20-50 \times 10^3/\mu l\). Sometimes there may be a left shift or signs of toxicity. The main differential diagnoses include severe infectious and inflammatory processes.

In most cases, ancillary tests are unable to detect a septic focus explaining the neutrophilia, and an antibiotic and anti-inflammatory treatment is usually prescribed for a suspected systemic infection. Ferrets with myofasciitis exhibit a significant increase in the neutrophils count with time that can be misinterpreted as a failed choice of the antibiotic. We must suspect the presence of an immune-mediated response (in this case, the myofasciitis) in those ferrets with no confirmed septic focus and an increase in neutrophils.

Other frequent analytical alterations in patients with myofasciitis include anaemia, mild or moderate, a moderate increase in alanine aminotransferase (ALT), hyperglycemia and hypoalbuminaemia. Generally, elevations in creatine kinase (CK) or aspartate aminotransferase (AST) values are not observed because the inflammation causes separation and atrophy of the muscle fibers, with minimal muscle necrosis.

Diagnostic imaging such as abdominal ultrasound and x-rays usually show non-specific alterations, mainly lymphadenopathy and splenomegaly; however, they are essential to rule out other diseases. In advanced cases, thickening of the oesophageal musculature can be seen on ultrasounds.

The presumptive diagnosis of myofasciitis can be established on the basis of the history and signalment (young ferret with compatible clinical signs), ancillary tests (Neutrophilic leukocytosis with no response to treatment) and absence of other pathologies that warrant the clinical picture.

**DEFINITIVE DIAGNOSIS**

Definitive diagnosis requires the histopathological study of muscle biopsies. Lesions consist mainly of moderate/severe pyogranulomatous inflammation in the fascia surrounding the muscle fascicles, and extending to perimysium and endomysium. Sometimes the inflammation can spread to the adipose tissue. Atrophy of muscle fibres can also be seen when the process is chronic.

References describe particularly serious injuries in the oesophagus, tongue, heart, diaphragm and intercostal muscles, but getting biopsy specimens from these locations is complex and invasive in living patients. Therefore, its utility is limited in daily clinical practice. In the authors' experience, biopsies from the semitendinosus and rectus abdominis are equally conclusive for the diagnosis of myofasciitis. Sampling in both locations is less invasive and supports the recovery of the patient. The group of caudal muscles of the hind limbs can be easily accessed after incising the skin, even with existing muscle atrophy. A biopsy from rectum abdominal can be performed in those ferrets undergoing exploratory laparotomy, without added complications.

**RESPONSE TO THE TREATMENT AND EVOLUTION**

To date, no effective treatment that reverses the disease in the long term or permanently has been established. Described protocols include drugs to modulate the inflammatory response such as
cyclophosphamide and prednisolone at immunosuppressive doses. In the author's experience, most patients presenting an acute form usually experience some degree of transient improvement, mainly related to the normalization of the temperature. Nevertheless, it is common that the medical treatment proves unsuccessful after few days, and the temperature reaches high values around 40-42 °C again.

Although ferrets suffering myofasciitis usually have hiporexia or anorexia, blended food is generally well accepted and they defecate and urinate normally. The disease can last from days to months, allowing the occurrence of chronic signs of myofasciitis. Muscle atrophy in extremities is associated with inability to walk, and the alterations in the oesophagus, diaphragm, intercostal muscles or heart can result in the appearance of swallowing disorders, tachycardia, tachypnoea, dyspnoea and death. The quality of life of the animal and the prognosis should be assessed in each case to establish the appropriate measures, such as humanitarian euthanasia.

REFERENCES